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An Annotated Checklist of the Terrestrial Mammals of Los Angeles County Part I: Didelphimorphia, Lagomorpha, and Rodentia

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Abstract.—An annotated checklist of the terrestrial mammals of Los Angeles County was compiled based on over 3,000 museum records. A total of 84 species of terrestrial mammals have been recorded from Los Angeles County, of which 42 species from three orders are included in Part I: Didelphimorphia, Lagomorpha, and Rodentia. Each species annotation includes a brief synonymy and description of its recorded distribution in the county. Although approximately 38% of Los Angeles County is developed or urban, it supports a diverse terrestrial mammal fauna that is mostly found in large natural and open space areas, such as the San Gabriel Mountains, Santa Monica Mountains, Santa Susanna Mountains, Griffith Park, Verdugo Mountains, Palos Verde Hills, Puente Hills, San Rafael Hills, Soledad Canyon, and Mojave Desert.

The Mammals of Los Angeles County was first published by the Natural History Museum of Los Angeles County (NHM-LAC) in 1944 (Willett 1944) and updated in 1959 (McLaughlin 1959). The 1959 update covered a total of 77 species, including marine mammals. Willett (1944) reported 65 species of terrestrial mammals in Los Angeles County. Fifteen years later McLaughlin (1959) reported 69 species of terrestrial mammals. Currently, Los Angeles County has documented records for 84 species of terrestrial mammals in 7 orders. This checklist (Part I) reports on 42 species of terrestrial mammals belonging to 3 orders: Didelphimorphia, Lagomorpha, and Rodentia.

Part 1 of this checklist includes eight species that were not reported previously in McLaughlin (1959). Three of these are the result of taxonomic revisions and five are the result of additional research. *Dipodomys microps*, *Chaetodipus fallax*, *C. formosus*, *Ondatra zibethicus* (which was introduced and may no longer be present), and *Erethizon dorsatum* were not listed by Willet (1944) or McLaughlin (1959) and are new to the Los Angeles County list as a result of additional research. *Neotoma bryanti*, *N. macrotis*, and *Peromyscus fraterculus* are new as a result of taxonomic revisions of species known to Willet (1944) and McLaughlin (1959) and were at the time considered subspecies of other more broadly distributed species. *P. fraterculus* was considered a coastal subspecies of *P. eremicus* (Riddle et al. 2000). *Neotoma bryanti* was thought to occur only on Cedros Island in Baja California, but studies by Patton et al. (2007) demonstrated that the coastal populations in California previously assigned to *N. lepida* are *N. bryanti*. *N. macrotis* was considered a subspecies of *N. fuscipes* and was re-elevated to specific status by Matocq (2002).

Willett (1944) and McLaughlin (1959) included the flying squirrel *Glaucomys sabrinus*, now classified as *G. oregonensis* (Arbogast et al. 2017) in their list of the mammals of Los Angeles County. The specimen referred to is labeled only "Los Angeles" so it is not included in this checklist nor is included in the comparisons above. However, this species most likely occurs in the San Gabriel Mountains of Los Angeles County (Willett 1944).

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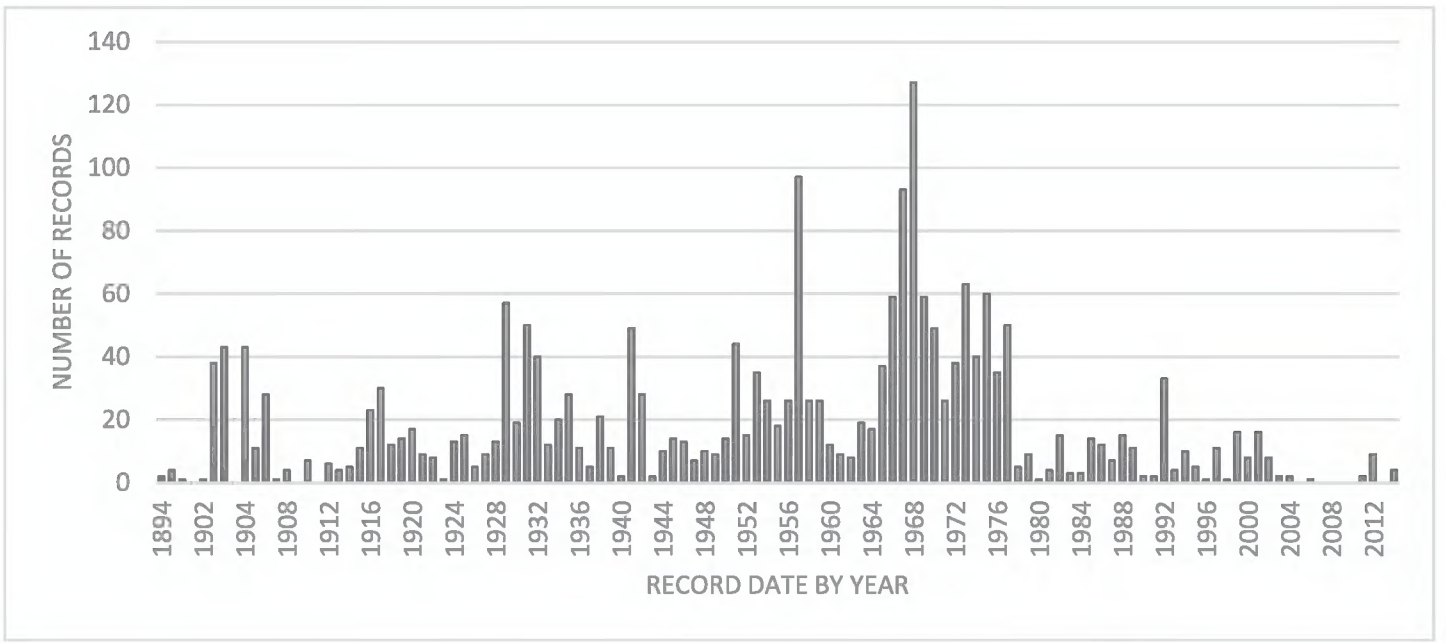

Fig. 1. Record Date Versus Number of Records for Mammals in the Orders Didelphimorphia, Lagomorpha, and Rodentia.

This species has been well documented in the neighboring San Bernardino Mountains in San Bernardino County (Brylski 1998).

In the over 60 years since McLaughlin (1959), additional research has increased our knowledge of the terrestrial mammal fauna of the county (e.g., Koler 1995; Sullivan and Best 1997; Haynie et al. 2007; Muchlinski et al. 2009; Johnson 2012; Phuong et al. 2014; Cooper and Muchlinski 2015). Since 1944, the records for terrestrial mammals in the three orders covered in this checklist have tripled. In 1944 there were 743 records; by 1959 the number of records increased to 1,123 and by 2014 there were 2,160. The last year for which the data set has records for Los Angeles County is 2014. The collection and deposition of voucher specimens from Los Angeles County into museum collections has tapered off in the last 40 plus years, especially since 1976 (Fig. 1).

Overall, based on the information available, the terrestrial mammal diversity of Los Angeles County is comparable to that of other less urbanized/developed counties. Neighboring Riverside and San Bernardino Counties have 87 and 97 recorded species of terrestrial mammals respectively. This comparison is all the more interesting given that the Los Angeles County mainland covers approximately 1,022,852 ha, of which approximately 389,422 ha (approx. 38%) are urban/developed. Development in Los Angeles County, especially that of the Los Angeles Basin has eliminated suitable habitat for all but those few species that have adapted to living within the urban/suburban environments, e.g., *Didelphis virginiana*, *Sciurus niger*, *Mus musculus*, and *Rattus* spp., all of which are introduced. However, some native species have also adapted to living in the urban/suburban/environment, e.g. *Sylvilagus audubonii*, *Otospermophilus beecheyi*, *Thomomys bottae*, *Lynx rufus*, *Canis latrans*, *Mephitis mephitis*, and *Procyon lotor* (Maestrelli 1990; Ordeñana et al. 2010). Habitat to support native terrestrial mammal species that are not urban and human tolerant, can be found in the remaining areas of large open spaces that still support native habitats, such as the San Gabriel Mountains, Santa Monica Mountains, Santa Susanna Mountains, Griffith Park, Verdugo Mountains, Palos Verdes Peninsula, Puente Hills, San Rafael Hills, Soledad Canyon, and Mojave Desert (Fig. 2). However, the continued presence of the species covered by this checklist in those open space areas needs confirmation by further studies.

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Fig. 2. Los Angeles County.

Part II of this checklist will report on the terrestrial mammals in the orders Eulipotyphla, Carnivora, Artiodactyla, and Chiroptera. This checklist is the result of research for a larger project documenting the presence, distribution, and natural history of terrestrial mammals throughout southern California and the southern and eastern Sierra Nevada (Blood 2018).

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Materials and Methods

The taxonomy and nomenclature used in this checklist generally follows Bradley et al. (2014) and Wilson et al. (2016 and 2017). This checklist reflects the most recently accepted nomenclature at the order, family, genus, species, and subspecies level based on a review of recent scientific literature. Common names generally follow those used in Bradley et al. (2014). Taxonomy above the genus level follows Burgin et al. (2018). Species and subspecies distributions are based on Hall (1981) modified with more recent literature.

Museum records for mammals in California were downloaded from the iDigBio database (iDigBio 2020). Records originated from multiple museums and the variation in identifications of those records reflect differences in curation, including unknown delays between specimen collection, curation, and installation into the collection, resulting in species identifications based on the nomenclature available at the time of curation. All records were reviewed for consistency in species nomenclature and edited into a consistent format, i.e., genus, species, and subspecies, or genus and species. Records identified to genus only and family only or as fossils were not used.

The edited records were imported into Psomas' Geographic Information System (GIS). Records were mapped as point localities using latitude and longitude (decimal degrees) present in the raw data. Point localities with more than one record were mapped as a single point. Distribution maps for each species and subspecies were reviewed and updated by matching the distribution against available maps and literature. Erroneous records were corrected, such as species and subspecies records located well outside the accepted distribution of that taxon. Those records that could not be reconciled with current taxonomy and distributions were deleted from the data set. Erroneous georeferenced records were also deleted from the data set. Generally, museum records with text only localities were not used because of the difficulty in determining the true location. GIS determined the area of Los Angeles County as well as the area of urban/developed county lands. These were calculated using State of California Department of Forestry and Fire Protection (CalFire) Fire and Resource Assessment Program (FRAP) GIS layers (https://frap.fire.ca.gov/mapping/gis-data/). Elevation ranges were obtained from the resulting point locality records using GIS analysis. Elevations are reported for Los Angeles County only. This checklist has relied on museum records, because observational records of species identifications cannot usually be verified. Museums represented in the database for which specimen records from Los Angeles County were used in this checklist are listed in Appendix 1.

The range of each species and its subspecies in Los Angeles County were determined by plotting the point localities onto a map of Los Angeles County and then analyzed using a web viewer developed by Psomas for this project. The range of each species includes historic and recent records. The distributions and elevations reported herein should therefore be considered a conservative estimate of both.

Annotated Checklist of the Terrestrial Mammals of Los Angeles County: Part I

Order Didelphimorphia

Family Didelphidae: Opossums

Didelphis virginiana: Virginia opossum

Didelphis virginiana Kerr, 1792:193. Type locality, Virginia.
Didelphis virginiana virginiana Grinnell, 1933:313. First use of current name combination.

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Of the four currently recognized subspecies of Virginia opossum (Gardner 1973; Hall 1981; McManus 1974), only *Didelphis virginiana virginiana* occurs in Los Angeles County. This species was introduced into California in 1910 and has spread throughout the state, primarily near human habitation, but it also occurs in natural areas, such as woodlands with permanent water (Grinnell et al. 1937; Gardner 1973; Jameson and Peeters 1988). The first Virginia opossums were imported by a San Jose jeweler and the animals were imported from Tennessee (Grinnell et al. 1937). Grinnell et al. (1937) provide an interesting account of the early spread of the Virginia opossum in California. The Virginia opossum is found in the Los Angeles Basin, Santa Monica Mountains, Verdugo Mountains, Griffith Park, and San Gabriel Mountains. Elevation records range from sea level to 1,417 m.

Order Lagomorpha

Family Leporidae: Rabbits and Hares

Lepus californicus: Black-tailed jackrabbit

Lepus californicus Gray, 1837:586. Type locality, St. Antoine, California. Near Mission San Antonio, Jolon, Monterey County, per Hall (1981).

Lepus bennettii Gray, 1843:35. Type locality, San Diego, San Diego Co., California. First use of current name combination.

L. c. bennettii Nelson, 1909:136. First use of current name combination. Note: Hoffman and Smith (2005) include *L.* c. *bennettii* as a synonym under *californicus*. However, Schai-Braun and Hackländer (2016) recognize *L.* c. *bennettii* as a valid subspecies. Until further studies provide more information on the relationships between subspecies in *L. californicus*, this checklist recognizes *L.* c. *bennettii* as a subspecies.

L. c. deserticola Mearns, 1895:564. Type locality "the western edge of the Colorado Desert, at the base of the Coast Range Mountains, in San Diego County (= Imperial Co. per Hall, 1981:326), California". First use of current name combination.

Of 17 currently recognized subspecies of the black-tailed jackrabbit (Best 1996; Hall 1981; Schai-Braun and Hackländer 2016) two occur in Los Angeles County: *Lepus californicus bennettii* and *deserticola*. *L. c. bennettii* is found in open to semi-open dry scrub habitats of the San Rafael Hills, Hansen Dam Park in San Fernando, San Gabriel Mountains along the San Gabriel River, Soledad Canyon, and it historically occurred throughout the coastal plain in suitable open habitats such as Long Beach Airport (personal observation in 1970's). The persistence of these coastal plain populations is unknown. There are museum records from the developed portions of the Los Angeles Basin, but these areas are now completely urbanized and developed and no longer support open scrub habitat for the black-tailed jackrabbit. Early records for this species in the Los Angeles Basin include Culver City in 1926 and 1928, Lankershim (now North Hollywood) in 1917, and Los Angeles in 1918. *L. c. bennettii* is a California Species of Special Concern (California Department of Fish and Wildlife (CDFW 2021). The desert subspecies, *L.* c. *deserticola*, is found in open to semi-open dry desert scrub habitats of the Mojave Desert. Elevation records range from 29 to 1,417 m.

Sylvilagus audubonii: Desert cottontail

Lepus auduboni (Baird, 1858:608). Type locality, San Francisco.

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Lepus sylvaticus var. *audubonii* J. A. Allen, 1877:332. Type locality, Beals Spring, 50 mi. W Fort Whipple, Arizona.
Sylvilagus audubonii: Nelson, 1909:214. First use of current name combination.
S. a. arizonae Nelson 1909:222. First use of current name combination.
Lepus floridanus sanctidiegi Miller, 1899:387. Type locality, Mexican Boundary Monument no. 258, (Pacific Ocean) San Diego Co., California.
S. a. sanctidiegi Nelson 1909:218. First use of current name combination. See above.

Of 12 recognized subspecies of the desert cottontail (Chapman and Willner 1978; Hall 1981; Schai-Braun and Hackländer 2016), two occur in Los Angeles County: *Sylvilagus audubonii arizonae* and *sanctidiegi*. *S. a. sanctidiegi* is found in woodland and scrub habitats in the Santa Monica Mountains, Simi Valley, Santa Susanna Mountains, and the lower elevations of the San Gabriel Mountains, such as along the San Gabriel River, and the Los Angeles Basin where suitable semi-open habitat is present, such as at Griffiths Park, vicinity of California State University Long Beach, and the Ballona Wetlands Ecological Reserve (Friesen et al. 1981; Koler 1995; Johnson 2012; Dunagan et al. 2019). Completely urbanized areas of the Los Angeles Basin such as downtown Los Angeles no longer support this species. Earlier records for this species in the Los Angeles Basin include the fossil beds at La Brea in 1951, Los Angeles in 1917, Downey in 1934 and Lankershim in 1915. The desert subspecies *S. a. arizonae* is found in desert scrub habitats of the Mojave Desert. Elevation records range from 12 to 1,812 m.

Sylvilagus bachmani: Brush rabbit

Lepus bachmani (Waterhouse, 1838:103). Type locality, California. Type locality restricted by Nelson (1909:247) to San Luis Obispo, California, USA.
Lepus cinerascens J. A. Allen, 1890a:159. Type locality, San Fernando, Los Angeles County, California.
Sylvilagus (*Microlagus*) *bachmani*: Lyon, 1904:336. First use of current name combination.
S. b. cinerascens: Nelson, 1909:252. First use of current name combination. See above.

Of 13 recognized subspecies of the brush rabbit (Chapman 1974; Hall 1981; Schai-Braun and Hackländer 2016), one occurs in Los Angeles County, *Sylvilagus bachmani cinerascens*. The brush rabbit is found in dense brushy habitats in the Santa Monica Mountains, Griffith Park, lower elevations of the western flanks and lower elevations along river and creek courses of the San Gabriel Mountains, Santa Clarita Valley, and Soledad Canyon. There are old records from the Los Angeles Basin, but these areas are now urbanized and no longer support suitable native habitat for the brush rabbit. For example, there is a record from 1916 1.6 km south of Lankershim and another record from 1917 from mid-Santa Monica. Elevation records range from 22 to 1,964 m.

Order Rodentia

Family Sciuridae: Squirrels

Ammospermophilus leucurus: White-tailed antelope squirrel

Tamias leucurus (Merriam, 1889a:20). Type locality, San Gorgonio Pass, Riverside County, California.

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Citellus leucurus: Elliot 1903a:210. Name combination.
Ammospermophilus leucurus: Mearns, 1907:299. First use of current name combination.
A. l. leucurus Taylor 1911:219. First use of current name combination. See above.

Of nine recognized subspecies of the white-tailed antelope squirrel (Belk and Smith 1991; Hall 1981), one occurs in Los Angeles County, *Ammospermophilus leucurus leucurus*. The white-tailed antelope squirrel is found in desert scrub habitats in the Mojave Desert. However, there are records near Acton in Soledad Canyon (NHM-LAC Mammal Collection numbers:47305, 47310, and 47306; captured in 1966) and along the foothills of the desert facing slopes of the San Gabriel Mountains. Elevation records range from 695 to 1,358 m.

Neotamias merriami: Merriam's chipmunk

Tamias asiaticus merriami (J. A. Allen, 1889:176). Type locality, San Bernardino Mts., 4,500 feet, San Bernardino County, California.
Tamias merriami J. A. Allen, 1890b:60. Name combination.
Eutamias merriami merriami Miller, 1912:310. See above.
Tamias [*merriami*] Nadler et al. 1977:350 consolidation of western North American chipmunks into the genus *Tamias*.
T. m. merriami Levenson et al. 1985:222.
N. m. merriami Paggio and Spicer 2001:346. Elevation of subgenus to generic status.

Western North American chipmunks have been placed in the genus *Eutamias*, subgenus *Neotamias* (Howell 1929) and placed in *Tamias* in the subgenus *Neotamias* (Levenson et al. 1985; Thorington and Hoffman 2005). Nadler (1977) placed all North American chipmunks in the genus *Tamias*. Paggio and Spicer (2001) elevated the subgenus *Neotamias* for western North American chipmunks to generic status. This elevation of *Neotamias* was reiterated by Patterson and Norris (2016). However, there are other opinions on the generic name for western North American chipmunks see Koprowski et al. (2016) and Sullivan et al. (2014) who retained the use of *Tamias*.

Of three recognized subspecies of Merriam's chipmunk (Best and Granai 1994; Hall 1981; Johnson 1943), one occurs in Los Angeles County, *Neotamias merriami merriami*. Merriam's chipmunk occurs in sage scrub, chaparral, and forested habitats of the San Gabriel Mountains where the majority of known locations occur south of State Route 14, in the Verdugo Mountains, and the San Rafael Hills. It also occurs in the Santa Monica Mountains (personal observation; Mammal Checklist of the Santa Monica Mountains National Recreation Area:down loaded 06/14/2021. https://www.nps.gov/samo/learn/nature/upload/SAMOMammalsChecklist.pdf). This species is likely more widespread than is currently recorded. Elevation records range from 127 to 2,217 m.

Neotamias speciosus: Lodgepole chipmunk

Tamias speciosus (Merriam, in J. A. Allen, 1890b:86). Type locality is San Bernardino Mts, Cal. Miller (1924) narrowed type locality to Head of White Water Creek, San Bernardino Mountains, San Bernardino County, California, Altitude 7,500 feet.

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Eutamias speciosus Merriam, 1897:202.
Eutamias speciosus speciosus: Miller 1912:314. See above.
Tamias [*speciosus*] Nadler et al. 1977:350 consolidation of western North American chipmunks into the genus *Tamias*.
N. s. specious Paggio and Spicer 2001:346. Elevation of subgenus to generic status.

Of four recognized subspecies of the lodgepole chipmunk (Best et al. 1994; Hall 1981; Johnson 1943), one occurs in Los Angeles County, *Neotamias speciosus speciosus*. The lodgepole chipmunk is restricted to the chaparral, black oak, and coniferous forest habitats in the San Gabriel Mountains. The San Gabriel Mountains population is isolated from other populations of this species to the north and to the south. Further south in the San Bernardino Mountains is the southern-most population of the lodgepole chipmunk, which is also currently considered *N. s. speciosus*. These two populations are separated from another isolated population (*N. s. callipeplus*) located to the north along the Kern County and Ventura County border in the vicinity of Mount Pinos. Elevation records range from 1,497 to 2,424 m.

Otospermophilus beecheyi: California ground squirrel

Arctomys (*Spermophilus*) *beecheyi* (Richardson, 1829:170). Type locality, "neighborhood of San Francisco and Monterey, in California;" restricted to Monterey, Monterey County, California, United States by Grinnell (1933:120).
Spermophilus beecheyi: Cuvier, 1831:331. Name combination.
Citellus nesioticus Elliot, 1904:263. Type locality, "Santa Catalina Island, [near Avalon] California, [USA]." Name combination.
Otospermophilus beecheyi: Mearns, 1907:324. First use of current name combination.
Citellus Oken, 1816:842. Unavailable name (International Commission on Zoological Nomenclature 1956).
C. b. beecheyi Grinnell 1913:345. See above.
C. b. nesioticus Grinnell 1913:346. See above.
O. b. beecheyi Smith et al. 2016:92. First use of current name combination. See above.
O. b. nesioticus Smith et al. 2016:92. First use of current name combination. See above.
Formerly placed in *Spermophilus*, as *S. beecheyi* in the subgenus *Otospermophilus* (Howell 1938). Helgen et al. (2009:282) elevated *Otospermophilus* to generic status.

Of the eight recognized subspecies of the California ground squirrel (Hall 1981; Smith et al. 2016; Phuong et al. 2014), two occur in Los Angeles County: *Otospermophilus beecheyi beecheyi* and *nesioticus*. *O. b. nesioticus* occurs only on Santa Catalina Island and *O. b. beecheyi* occurs on the mainland. *O. b. beecheyi* is found in areas of open habitat and parkland, including Exposition Park, Griffiths Park, Elysian Park, Ballona Wetlands Ecological Reserve, Palos Verdes Peninsula, San Gabriel Mountains, Mojave Desert, and the Santa Monica Mountains. This species is very tolerant of urbanized landscapes and is present in many parks and open space areas throughout the County. Elevation records range from 4 to 2,109 m.

Sciurus griseus: Western gray squirrel

Sciurus griseus Ord, 1818:152. Type locality, The Dalles, Columbia River, Wasco County, Oregon.

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S. g. anthonyi Mearns, 1897:264. Type locality, Campbell's Ranch, at Laguna, San Diego County, California. First use of current name combination.

Of the three recognized subspecies of the western gray squirrel (Carraway and Verts 1994; Hall 1981), one occurs in Los Angeles County, *Sciurus griseus anthonyi*. The western gray squirrel is found in areas of oak and evergreen woodland, and in areas with planted pines and other conifers, open space and parkland with native forest habitats, including the San Gabriel Mountains, the Santa Monica Mountains, Griffiths Park, Frank G. Bonelli Regional Park, foothills near Pasadena, Burbank, and Glendora. Elevation records range from 93 to 2,416 m.

Taxonomic note: de Abreu-Jr et al. (2020) have split the genus *Sciurus* into 10 genera. This revision is recent and this checklist is retaining the use of *Sciurus* pending acceptance of this taxonomic scheme by the scientific community.

Sciurus niger: Eastern fox squirrel

Sciurus niger Linnaeus, 1758:64. Type locality, probably from southern South Carolina.
S. rufiventer Geoffroy St. Hilaire, 1803:176. Type locality, Mississippi Valley probably between southern Illinois and central Tennessee (Osgood, 1907). Name combination.
S. n. rufiventer: Osgood, 1907:44. First use of current name combination. See above.

Of the ten recognized subspecies of the eastern fox squirrel (Hall 1981; Koprowski 1994), the one reported to be present in Los Angeles County is *Sciurus niger rufiventer* (Willett 1944; McLaughlin 1959). This species was introduced into California around 1904 at the Sawtelle Veterans Home on Sepulveda and Wilshire Boulevards in the City of Los Angeles (Muchlinski et al. 2009). Historically, this introduced species was generally restricted to areas of human habitation, but currently its range extends into areas of the wildland/urban interface (Cooper and Muchlinski 2015). In these interface areas it has become sympatric with the western gray squirrel and appears to be displacing the western gray squirrel (Muchlinski et al. 2009; Cooper and Muchlinski 2015). The eastern fox squirrel is found in Santa Clarita Valley, San Fernando Valley, Santa Monica Mountains, Malibu, along the coast from Santa Monica to the Palos Verdes Hills, Long Beach, west Los Angeles, Beverly Hills, Griffith Park, San Gabriel Valley Communities, San Rafael Hills, Pomona, and Claremont (King 2004).

Xerospermophilus mohavensis: Mojave ground squirrel

Spermophilus mohavensis (Merriam, 1889b:15). Type locality, about 15 miles east of Mohave River at Hesperia, San Bernardino County, California.
Xerospermophilus mohavensis: Gromov et al. 1965. First use of current name combination. Formerly placed in *Spermophilus*, as *S. mohavensis* in the subgenus *Xerospermophilus* (Howell 1938). Helgen et al. (2009:294) elevated *Xerospermophilus* to generic status.

The Mojave ground squirrel is monotypic (Hall 1981; Best 1995; Helgen et al. 2009), and is found in desert succulent shrub and desert scrub habitats in the Mojave Desert. It is now absent from much of its former southern range in the Antelope Valley in the vicinity of the cities of Lancaster and Palmdale (Leitner 2008; 2021). The Mohave ground squirrel

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is listed under the California Endangered Species Act as a California Threatened Species (California Department of Fish and Wildlife 2020). Elevation records range from 739 to 1,038 m.

Family Heteromyidae

Subfamily Dipodomyinae

Dipodomys agilis: Agile kangaroo rat

Dipodomys agilis Gambel, 1848:77. Type locality, Pueblo de los Ángeles, Upper California.
Perodipus perplexus Merriam, 1907:79. Type locality, Walker Basin, Kern County, California.
D. a. agilis Grinnell, 1921:96. First use of current name combination. See above.
D. a. perplexus Grinnell, 1921:96. First use of current name combination. See above.

There are two recognized subspecies of the agile kangaroo rat (Sullivan and Best 1997; Hall 1981), both of which occur in Los Angeles County: *Dipodomys agilis agilis* and *perplexus*. *D. a. agilis* is found in coastal sage scrub, chaparral, montane chaparral, and forest habitats in the San Gabriel Mountains, Santa Susana Mountains, Santa Monica Mountains, Palos Verdes Hills, San Rafael Hills, Santa Clarita Valley, and as far north as Lake Castaic. There are records from this species from the developed portion of the Los Angeles Basin including presumably the type locality. Gambel (1848) noted that this animal is abundant in the vineyards and cultivated fields of the "Pueblo de Los Angeles". Other early records from the Los Angeles Basin including Los Angeles from 1924, Sawtelle (now West Los Angeles) from 1925, and Alhambra from 1907. These areas are completely developed and urbanized and no longer support habitat for the agile kangaroo rat. *D. a. perplexus* is found at Pyramid Lake north to the border with Kern County, the desert facing slopes of the San Gabriel Mountains, and the Mojave Desert as far south as Lancaster. Elevation records from range from 40 to 2,415 m.

Dipodomys deserti: Desert kangaroo rat

Dipodomys deserti Stephens, 1887:42. Type locality, Mojave River, 3-4 mi. from, and opposite, Hesperia, San Bernardino County, California.
D. d. deserti Burt, 1934:415. First use of current name combination. See above.

Of the four recognized subspecies of the desert kangaroo rat (Hall 1981; Best et al. 1989), one occurs in Los Angeles County: *Dipodomys deserti deserti*. The desert kangaroo rat is found in low desert scrub habitat in areas with deep wind-blown sand deposits or stabilized dunes in the Mojave Desert in the vicinity of Lake Los Angeles and Saddleback Butte State Park. Elevation records range from 685 to 1,039 m.

Dipodomys merriami: Merriam's kangaroo rat

Dipodomys merriami Mearns, 1890:290. Type locality is New River, between Phoenix and Prescott, Maricopa County Arizona.
D. m. merriami Burt, 1934:413. First use of current name combination.

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Of the 19 recognized subspecies of Merriam's kangaroo rat, one occurs in Los Angeles County: *Dipodomys merriami merriami* (Lidicker 1960; Hall 1981). Merriam's kangaroo rat is found in desert scrub habitat in areas with sparse to moderate canopy with fine to coarse sandy soils in the Mojave Desert. However, it tolerates a wide variety of habitat conditions. There is one record east of Canyon Country in Soledad Canyon on the Santa Clara River. This record represents the western-most record of *D. merriami* in Los Angeles County (NHM-LAC No. 38067 captured in 1968). Other kangaroo rats recorded from this area include *D. agilis* and *D. panamintinus*. Elevation records range from 502 to 1,499 m.

Dipodomys microps: Chisel-toothed kangaroo rat

Perodipus microps (Merriam, 1904a:145). Type locality, Lone Pine, Owens Valley, Inyo County, California.
Dipodomys microps: Grinnell, 1921:94. First use of current name combination.
D. m. microps Grinnell, 1933:164. First use of current name combination. See above.

Of the 13 recognized subspecies of the chisel-toothed kangaroo rat (Hall 1981; Hayssen 1991), one occurs in Los Angeles County: *Dipodomys microps microps*. The chisel-toothed kangaroo rat is found only in the desert scrub habitats supporting stands of saltbush in the Mojave Desert south of Rosamond Dry Lake. Elevation records range from 695 to 701 m. This species was not reported in Willet (1944) and McLaughlin (1959).

Dipodomys panamintinus: Panamint kangaroo rat

Perodipus panamintinus (Merriam, 1894a:114). Type locality, Panamint Mts. [Inyo Co.], California (on head of Willow Creek).
Perodipus mohavensis Grinnell, 1918:428. Type locality, ½ mi east of Railway Station at Warren, 3,275 ft, about 5 miles north Mojave, Kern County, California. Name combination.
Dipodomys panamintinus: Grinnell, 1921:95. First use of current name combination.
D. p. mohavensis Hall, 1946:410. First use of current name combination. See above.

Of the five recognized subspecies of the Panamint kangaroo rat (Hall 1981; Intress and Best 1990), one occurs in Los Angeles County: *Dipodomys panamintinus mohavensis*. The Panamint kangaroo rat is found associated with sandy-gravelly soils, with an overstory of sagebrush, pinyon pine, juniper, or yucca, and desert scrub areas of the Mojave Desert and on the desert facing foothills of the San Gabriel Mountains. There are records from the lower elevation valleys from Soledad Canyon near Acton and Vasquez Rocks Natural Area Park. The presence of pinyon-juniper woodland habitat along the Santa Clara River Valley has allowed the Panamint kangaroo rat to move west into the San Gabriel Mountains from the Antelope Valley (Intress and Best 1990). Elevation records range from 580 to 2,159 m.

Subfamily Perognathinae

Chaetodipus californicus: California pocket mouse

Perognathus californicus (Merriam, 1889c:26). Type locality, Berkeley, Alameda County, California.
C[*haetodipus*] *californicus*: Hafner and Hafner, 1983:24. Elevation of subgenus to generic status. First use of current name combination.

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C. c. bernardinus (Benson, 1930:449). Type locality, 2 mi. E. Strawberry Peak, 5750 ft., San Bernardino Mts., San Bernardino Co., California.
C. c. dispar (Osgood, 1900:58). Type locality, Carpinteria, Santa Barbara County, California.
C. c. ochrus (Osgood, 1904:128). Type locality, Santiago Spring, 16 mi. SW McKittrick, Kern County, California.

Of the eight recognized subspecies of the California pocket mouse (Hall 1981), three occur in Los Angeles County: *Chaetodipus californicus bernardinus*, *dispar* and *ochrus*. The California pocket mouse is found in coastal sage scrub, chaparral, and montane habitats in areas with gravelly soils and dense cover. *C. c. dispar* is found on the coastal foothills of the San Gabriel Mountains, and in the large open space areas such as the Santa Monica Mountains, Palos Verdes Hills, Griffith Park, Verdugo Mountains, San Rafael Hills, San Jose Hills, and along the desert facing foothills of the San Gabriel Mountains. *C. c. bernardinus* is found near the border with San Bernardino County in the vicinity of Wrightwood, while *C. c. ochrus* is found in the northern portion of the County in the San Gabriel Mountains and foothills north of Mount Emma. Elevation records range from 30 to 1,964 m.

Chaetodipus fallax: San Diego pocket mouse

Perognathus fallax (Merriam, 1889c:19). Type locality, Reche Canyon, 1250 feet, 3 miles southeast of Colton, San Bernardino County, California.
C[*haetodipus*] *fallax*: Hafner and Hafner, 1983:24. Elevation of subgenus to generic status. First use of current name combination.
C. f. fallax (Mearns 1901:135). See above.
C. f. pallidus (Mearns, 1901:135). Type locality "Mountain Spring, half-way up the east slope of the Coast Range Mountains, on the Mexican Boundary Line, in San Diego County, California." (type locality now within Imperial County- Huey 1960).

Of the five recognized subspecies of the San Diego pocket mouse (Hall 1981; Lackey 1996), two occur in Los Angeles County: *Chaetodipus fallax fallax* and *pallidus*. Both of these are California Species of Special Concern (CDFW 2020). The San Diego pocket mouse has a limited distribution in Los Angeles County. *C. f. fallax* is found in coastal sage scrub and chaparral with rocky or coarse gravel soils in the southeastern portion of Los Angeles County in the Claremont Hills Wilderness Park near the border with San Bernardino County, and westward to Palos Verdes Peninsula. *C. f. pallidus* is found in desert scrub and pinyon-juniper habitats in the Mojave Desert area and along the desert facing foothills of the San Gabriel Mountains in the vicinity of Valyermo and in a few locations in the Angeles National Forest in the Rock Creek Watershed. Elevation records range from 524 to 1,618 m. This species was not reported in Willet (1944) and McLaughlin (1959).

Chaetodipus formosus: Long-tailed pocket mouse

Perognathus formosus (Merriam, 1889c:17). Type locality, St. George, Washington County, Utah.
C[*haetodipus*] *formosus*: Hafner and Hafner, 1983:24. Elevation of subgenus to generic status. First use of current name combination.

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C. f. mohavensis (Huey, 1938a:35). Type locality, Bonanza King Mine, Providence Mountains, San Bernardino County, California.

Of the nine recognized subspecies of the long-tailed pocket mouse (Hall 1981), one occurs in Los Angeles County: *Chaetodipus formosus mohavensis*. The long-tailed pocket mouse is found in desert scrub habitats with rocky or stony soils usually associated slopes or canyons with sparse to dense desert shrub canopy. These areas are often found at the base of cliffs or at the mouth of canyons in the Mojave Desert east of Lancaster near the border with San Bernardino County, plus a few records from the lower elevations of the desert facing slopes and foothills of the San Gabriel Mountains. Elevation records range from 724 to 1,364 m. This species was not reported in Willet (1944) and McLaughlin (1959).

Chaetodipus penicillatus: Desert pocket mouse

Perognathus penecillatus (Woodhouse, 1852:200). Type locality, 1 mi. SW Parker, Yuma County, Arizona.

Perognathus penicillatus Woodhouse, 1853:49. Corrected spelling of *Perognathus penecillatus* Woodhouse, 1852.

C[*haetodipus*] *penicillatus*: Hafner and Hafner, 1983:24. Elevation of subgenus to generic status. First use of current name combination.

C. p. angustirostris (Osgood, 1900:47). Type locality, Carrizo Creek, Colorado Desert, Imperial County, California.

Of the six recognized subspecies of the desert pocket mouse (Hall 1981), one occurs in Los Angeles County: *Chaetodipus penicillatus angustirostris*. The desert pocket mouse is found in desert scrub habitats with soft alluvium, sandy, or silty soils along stream bottoms, desert washes of the Mojave Desert area east of Lancaster in the vicinity of Lake Los Angeles. Elevation records range from 724 to 1,038 m.

Perognathus alticola: White-eared pocket mouse

Perognathus alticolus Rhoads, 1894a:412. Type locality, Squirrel Inn near Little Bear Valley, San Bernardino Mts., San Bernardino County, California.

P. a. inexpectatus Huey, 1926:121. Type locality, 14 miles W. Lebec, 600 ft., Kern County, California. First use of current name combination.

Of the two subspecies of the white-eared pocket mouse (Hall 1981; Best 1994), one occurs in Los Angeles County: *Perognathus alticola inexpectatus*. The white-eared pocket mouse is found in chaparral, sagebrush scrub, and pinyon-juniper habitats in the vicinity of Lake Hughes, and north of Quail Lake in the vicinity of Gorman near the Los Angeles-Kern County border in the northeastern portion of Los Angeles County along the desert facing foothills of the San Gabriel Mountains. Elevation records range from 1,017 to 1,276 m.

Perognathus inornatus: San Joaquin pocket mouse

Perognathus inornatus Merriam, 1889c:15. Type locality is Fresno, Fresno County, California.

P. longimembris neglectus Taylor 1912:155. Type locality is McKittrick, Kern County, California, altitude 1,111 feet.

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P. i. neglectus Osgood, 1918:96. First use of current name combination. See above.

Of the three recognized subspecies of the San Joaquin pocket mouse (Hall 1981; Best 1993), one occurs in Los Angeles County: *Perognathus inornatus neglectus*. The San Joaquin pocket mouse is found in desert scrub habitats in areas with sandy washes and finely textured soils in the Mojave Desert and along the desert facing foothills of the San Gabriel Mountains as far south as Palmdale. Elevation records range from 799 to 1,162 m.

Perognathus longimembris: Little pocket mouse

O[*tognosis*] *longimembris* (Coues, 1875:305). Type locality is Old Fort Tejon, Tehachapi Mountains, Kern County, California.
Perognathus longimembris: Merriam, 1889c:13. First use of current name combination.
Perognathus pacificus Mearns, 1898:299. Type locality, Mexican Boundary Monument No. 258, shore of Pacific Ocean, San Diego County, California. Name combination.
Perognathus panamintinus brevinasus Osgood 1900:30. Type locality, San Bernardino California.
P. l. brevinasus Huey, 1928:88. First use of current name combination. See above.
P. l. longimembris Grinnell, 1921:318. First use of current name combination. See above.
P. l. pacificus von Bloeker, 1932a:128. First use of current name combination. See above.

Of the nineteen recognized subspecies of the little pocket mouse (Hall 1981), three occur in Los Angeles County: *Perognathus longimembris brevinasus*, *longimembris*, and *pacificus*. The Pacific pocket mouse (*P. l. pacificus*) is federally listed as endangered and is a California Species of Special Concern (USFWS 1994; CDFW 2020). The Los Angeles little pocket mouse (*P. l. brevinasus*) is a California Species of Special Concern (CDFW 2020). The little pocket mouse is found in alluvial systems such as desert riparian, desert scrub, desert wash, coastal dunes, and coastal sage scrub habitats. It is associated with loose and deep sandy soils or in areas immediately adjacent to such habitats, but it can also be found on gravel washes and on stony soils. Records for *P. l. pacificus* indicate it once occurred along the Los Angeles County coast from Marina del Rey (south of Ballona Creek) to Long Beach; however, these populations are now extinct (USFWS 1998). McLaughlin (1959) indicated that the status of this taxon was doubtful because of habitat destruction along the coast. The few records of *P. l. brevinasus* from the county are from the developed portion of the Los Angeles Basin including San Fernando Valley from 1932; however, this area no longer supports habitat for this species. The desert subspecies *P. l. longimembris* occurs in the northern Mojave Desert including the desert facing foothills of the San Gabriel Mountains. There are also records for this subspecies from Soledad Canyon along the Santa Clara River, and from the Hungry Valley-Pyramid Lake area. Elevation records range from 11 to 1,318 m. This species needs revision (Williams 1986; Hafner 2016). Although there has been some recent research (e.g., McKnight 2005; Swei et al. 2010), taxonomic relations within the species remain unclear.

The taxonomic relationship between *P. inornatus* and *P. longimembris* has historically been intertwined (Best 1993; Hafner 2016; Williams et al. 1993). Osgood (1900) in his revision of *Perognathus* synonymized *P. inornatus* into *P. longimembris*. Later, Osgood (1918) revised this opinion based on a review of additional and better-preserved museum material and a reevaluation of the type specimen of *P. longimembris* and resurrected *P. inornatus* to species status. The type locality of *P. longimembris* (Old Fort Tejon, California) is located

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in areas where both species can occur and also in an area where few *Perognathus* have been captured for nearly 100 years (Hafner 2016; Osgood 1918).

It is currently accepted that *P. longimembris* does not occur in the San Joaquin Valley where the majority of the known range of *P. inornatus* is located (Best 1993; Hafner 2016; Hall 1981; Williams et al. 1993). However, the known range of *P. inornatus* extends south of the Central Valley beyond the Tehachapi Mountains into the Mojave Desert area of northern Los Angeles County. In this area *P. inornatus* broadly co-occurs with *P. longimembris* as far south as Palmdale.

Family Geomyidae

Thomomys bottae: Botta's pocket gopher

Oryctomys (*Saccophorus*) *bottae* (Eydoux and Gervais, 1836:23). Type locality, coast of California. Restricted to vicinity of Monterey, Monterey County by Baird (1855).
Thomomys bottae: Baird, 1855:335. First use of current name combination.
T. b. pascalis Merriam 1901:11 Type locality "Fresno, San Joaquin Valley, California."
Thomomys talpoides perpallidus Merriam, 1886: Type locality, "the arid Colorado desert, in southern California." Reported as "Palm Springs [formerly Agua Caliente, Riverside County, Calif.]" by Miller and Kellogg (1955:284).
T. b. bottae Bailey, 1915:45. First use of current name combination. See above.
T. b. perpallidus Goldman, 1935:155. First use of current name combination.

One hundred ninety-five subspecies of Botta's pocket gopher have been described (Hall 1981; Jones and Baxter 2004), mostly based on geographic variation in pelage color pattern, and skull morphology (Smith and Patton 1988), some of which were previously described as distinct species (Jones and Baxter 2004; Patton 2005). Patton and Smith's (1990) revision of the subspecies of *T. bottae* in California reduced the number of recognized subspecies to 15. Three occur in Los Angeles County: *Thomomys bottae bottae, pascalis*, and *perpallidus*. Botta's pocket gopher is found throughout Los Angeles County. The nominate subspecies (*T. b. bottae*) is the found along the coast and throughout the Los Angeles Basin. Its range extends east into the San Gabriel Mountains including the desert facing foothills. *T. b. perpallidus* occurs in the Mojave Desert area of northeastern Los Angeles County as far west as Lancaster. The third subspecies, *T. b. pascalis*, occurs in the Mojave Desert area to the west of *perpallidus* and as far east as the Antelope Valley Poppy Reserve. Botta's pocket gopher, like other pocket gophers, is limited in its distribution by soil type and quality. Elevation records range from sea level to 3,004 m.

Family Cricetidae

Subfamily Arvicolinae

Microtus californicus: California vole

Arvicola californica (Peale, 1848:46). Type locality, vicinity of San Francisco Bay, California.
[*Microtus*] *californicus*: Trouessart, 1897:563. First use of current name combination.
M. c. sanctidiegi Kellogg, 1922:78. Replacement name for *M. c. neglectus* Kellogg, 1918. Type locality, "Escondido, 640 feet altitude, San Diego County, California." First use of current name combination.

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M. c. stephensi von Bloeker, 1932b:134. Type locality, Playa del Rey, Los Angeles County, California. First use of current name combination.

Of the seventeen subspecies of the California vole currently recognized (Hall 1981; Cudworth and Koprowski 2010; Patton and Conroy 2017), two occur in Los Angeles County: *Microtus californicus sanctidiegi* and *stephensi*. In Los Angeles County, the California vole is found in coastal sage scrub, chaparral, oak woodlands, grasslands, and coastal wetlands. *M. c. stephensi* is found along the coast including, the Santa Monica Mountains, Palos Verdes Hills, and the Ballona Wetlands Ecological Reserve (Johnson 2012). There are a few records from the central portion of the Los Angeles Basin, such as Sawtelle and Culver City from 1927, del Rey from 1935, and the Dominguez Channel from 1955; however, these areas are fully developed and no longer support habitat for the California vole. *M. c. sanctidiegi* is found in the San Gabriel Mountains and as far west as the I-210 corridor, San Fernando Valley, Santa Susanna Mountains, Santa Clarita Valley, and northwards into the Mojave Desert. Elevation records range from sea level to 2,012 m.

Ondatra zibethicus: Muskrat

Castor zibethicus (Linnaeus, 1766:79). Type locality, eastern Canada.
O. Coypus, Zibethicus: Link, 1795:76. Fist use of current name combination.

There are only two museum records for the muskrat in Los Angeles County: one from El Monte captured in 1936 and one from Palmdale. Muskrats are native only to the Colorado River area in California; other populations have resulted from introductions or escapees from fur farms (Shuler 2000). This species was not reported in Willet (1944) and McLaughlin (1959) and there is no recent evidence in the scientific literature for the persistence of this species in Los Angeles County.

Subfamily Neotominae

Neotoma bryanti: Bryant's woodrat

Neotoma bryanti Merriam, 1887:191. Type locality, Cedros Island, Baja California, Mexico.
Neotoma lepida intermedia Rhoads, 1894b:69. Type locality, "Dulzura, San Diego Co., Cal[ifornia]."
N. b. intermedia Patton, et al., 2007:373. First use of current name combination.

Of the five recognized subspecies of Bryant's woodrat, one occurs in Los Angeles County: *Neotoma bryanti intermedia* (Patton et al. 2007). This subspecies is a California Species of Special Concern (CDFW 2020). In Los Angeles County, Bryant's woodrat is found in coastal sage scrub, chaparral, Joshua tree, and pinyon-juniper habitats in the Santa Monica Mountains, Palos Verdes Hills, San Gabriel Mountains including the desert facing foothills and into the Mojave Desert west of the Antelope Valley Poppy Reserve, Santa Susanna Mountains, and along Soledad Canyon. There are some records from the Los Angeles Basin; however, these areas no longer support habitat for Bryant's woodrat. Elevation records range from 4 to 1,727 m. This species was not reported in Willet (1944) and McLaughlin (1959) because at that time the populations in Los Angeles County were considered members of *N. lepida*.

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Neotoma lepida: Desert woodrat

Neotoma lepida Thomas, 1893:235. Type locality, somewhere on "Simpsons route" between Camp Floyd [= Fairfield], Utah and Carson City, Nevada.
N. l. lepida Goldman, 1932:61. First use of current name combination. See above.

Of the three recognized subspecies of the desert woodrat (Patton et al. 2007; Verts and Carraway 2002), one occurs in Los Angeles County: *Neotoma lepida lepida*. The desert woodrat is found in desert scrub, creosote bush scrub, Joshua tree, and pinyon-juniper habitats and prefers areas with rock outcrops and rocky cliffs and slopes in the Mojave Desert area of northern Los Angeles County. Elevation records range from 697 to 1,163 m.

Neotoma macrotis: Big-eared woodrat

Neotoma fuscipes Baird, 1858:495. Type locality "Petaluma, [Sonoma Co.], California."
Neotoma macrotis Thomas, 1893:234. Type locality is San Diego, San Diego County, California. First use of current name combination.
Neotoma macrotis: Matocq, 2002:880. Reinstated to species status.
Neotoma fuscipes macrotis Merriam, 1894b:246. See above.
N. m. macrotis Patton, 2017:112. First use of current name combination.
N. m. simplex True, 1894a:354. Type locality is Fort Tejon, Kern County, California. First use of current name combination.

Of the three subspecies of big-eared woodrat (Carraway and Verts 1991; Matocq 2002), two occur in Los Angeles County: *Neotoma macrotis macrotis* and *simplex*. *N. m. macrotis* is found in chaparral, coast live oak, woodland, and riparian habitats in the San Gabriel Mountains, Santa Monica Mountains, Griffith Park, Santa Susanna Mountains, Santa Clarita Valley, San Rafael Hills, Puente Hills, and Soledad Canyon. Early records from the Los Angeles Basin include Lankershim from 1917, Sawtelle from 1929 and San Fernando from 1903, but those areas are now developed and do not support habitat for the big-eared woodrat. *N. m. simplex* is found in the desert facing foothills of the San Gabriel Mountains abutting the Mojave Desert and ranging north to the Tehachapi Mountains. Elevation records range from 4 to 2,415 m. This species was not reported in Willet (1944) and McLaughlin (1959) because at that time the populations in Los Angeles County were considered members of *N. fuscipes*.

Onychomys torridus: Southern grasshopper mouse

Hesperomys (*Onychomys*) *torridus* (Coues, 1874:183). Type locality, Old Camp Grant, Arizona; modified by Cockrum (1960) to Old Camp Grant [jct. Aravaipa Creek and San Pedro River, 2,160 feet, T 7 S, R16 E, 8 mi north and 5 miles west of Mammoth, Pinal County, Arizona.
Onychomys ramona Rhoads, 1893:833. Type locality, Reche Canyon, 1250 ft., 4 miles SE [Colton], San Bernardino, California. Name combination.
Onychomys pulcher Elliot, 1903b:243. Type locality, Morongo Pass, San Bernardino Mountains, California. Name combination.
O. t. ramona Merriam, 1904b:124. First use of current name combination. See above.
O. t. pulcher Hollister, 1913:215. First use of current name combination. See above.

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Of the 13 recognized subspecies of the southern grasshopper mouse (McCarty 1975; Hall 1981), two occur in Los Angeles County: *Onychomys torridus pulcher* and *ramona*. *O. t. ramona* is a California Species of Special Concern (CDFW 2020). The southern grasshopper mouse is found in open areas with gentle terrain in desert scrub, coastal sage scrub, and mixed chaparral habitats. *O. t. pulcher* is found east of the San Gabriel Mountains in the Mojave Desert. *O. t. ramona* is found along Soledad Canyon and the State Route 14 corridor as far west as Mint Canyon. Elevation records range from sea level to 1,623 m.

Peromyscus boylii: Brush deermouse

Hesperomys boylii (Baird, 1855:335). Type locality, "middle fork of the American River, California," near Auburn, Eldorado Co., California.
Sitomys rowleyi J. A. Allen, 1893:76. Type locality Nolan's Ranch, N side San Juan River, San Juan Co., about 11/2 mi. above Four Corners, Utah."
P[eromyscus]. b[oylii]. rowleyi Mearns, 1896:139. First use of current name combination. See above.

Of the 4 recognized subspecies of the brush deermouse (Hall 1981; Carleton 1989; Kalcounis-Rueppell and Spoon 2009; Bradley 2017a), one occurs in Los Angeles County: *Peromyscus boylii rowleyi*. The brush deermouse is found in chaparral, oak shrub, pinyon-juniper, and riparian habitats with a sparse understory of grass-forbs in the San Gabriel Mountains, Santa Monica Mountains, Santa Susanna Mountains, and the Verdugo Mountains. There are a few records for the alluvial drainages in the northeastern part of the county in the vicinity of Valyermo in the Mojave Desert. Elevation records range from 40 to 2,415 m.

Peromyscus californicus: California deermouse

Mus californicus (Gambel, 1848:78). Type locality, Monterey, California.
Peromyscus californicus Thomas, 1894:364. First use of current name combination.
Peromyscus insignis Rhoads, 1895:33. Type locality, Dulzura, San Diego County, California. Name combination.
P. c. insignis Mearns, 1907:429. First use of name combination. See above.

Of the five subspecies of the California deermouse (Merritt 1978; Hall 1981; Carleton 1989), one occurs in Los Angeles County: *Peromyscus californicus insignis*. The California deermouse is found in chaparral, coastal sage scrub and wooded habitats in the San Gabriel Mountains, Santa Monica Mountains, Santa Susanna Mountains, Verdugo Mountains, Soledad Canyon, and the desert facing slopes of the San Gabriel Mountains. It is closely associated with the California laurel tree and also woodrat nests, which are often used as shelters. Elevation records range from sea level to 1,964 m.

Peromyscus crinitus: Canyon deermouse

Hesperomys crinitus (Merriam, 1891:53). Type locality, Shoshone Falls, N. side of Snake River, Jerome County, Idaho.
Peromyscus crinitus: Bangs, 1899:67. First use of current name combination.
Peromyscus stephensi Mearns, 1897. Type locality, 3 miles E. Mountain Spring, Imperial County, California.

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P. c. stephensi Osgood, 1909:232. First use of current name combination. See above.

Of the eight recognized subspecies of the canyon deermouse (Hall 1981; Johnson and Armstrong 1987; Carleton 1989), one occurs in Los Angeles County: *Peromyscus crinitus stephensi*. The canyon deermouse is in areas with rocky substrates and slopes sparsely vegetated in desert scrub, chaparral, pinyon-juniper, and Joshua tree habitats on the lower elevation slopes on the east and west side of the San Gabriel Mountains and in the Mojave Desert in the vicinity of Lake Los Angeles. Elevation records range from 232 to 2,159 m.

Peromyscus eremicus: Cactus deermouse

Hesperomys eremicus (Baird 1858:479). Type locality is Old Fort Yuma, Imperial County, California.
Peromyscus eremicus: J. A. Allen, 1895:226. First use of current name combination.
P. e. [*eremicus*] Osgood, 1909:239. See above.

There are 14 subspecies of cactus deermouse (Veal and Caire 1979; Hall 1981; Carleton 1989; Riddle et al. 2000), one of which occurs in Los Angeles County: *Peromyscus eremicus eremicus*. The cactus deermouse is found in in desert scrub habitat with moderate to dense canopies of cactus and sandy soils along the desert facing foothills of the San Gabriel Mountains and in the Mojave Desert area of northern Los Angeles County. Elevation record from Los Angeles County is 955 m. Interestingly, there is a lack of records from northern Los Angeles County and southeastern Kern County in the area surrounding Rosamond, California City, and Mojave in Kern County southward into the Antelope Valley in Los Angeles County. However, there are numerous records north of California City, Kern County, and north of Barstow and Victorville in San Bernardino County.

Peromyscus fraterculus: Northern Baja deermouse

Vesperimus fraterculus (Miller, 1892:261). Type locality, Dulzura, San Diego County, California.
[*Peromyscus*] *fraterculus*: Trouessart 1897:515. First use of current name combination.
Peromyscus eremicus fraterculus Allen 1898:154. See above.
Peromyscus fraterculus: Riddle et al. 2000:153. Reinstated to species status.

Peromyscus fraterculus is monotypic (Riddle et al. 2000) and was formerly considered a subspecies of the cactus deermouse (*P. eremicus*). The specific status of *P. fraterculus* has been generally accepted (Bradley 2017b; Mammal Diversity Data Base 2020); however, Tremor et al. (2017) retained *fraterculus* as a subspecies of *P. eremicus* pending more studies that include specimens from southern California. The northern Baja deermouse is found in coastal scrub, chaparral, and other sage scrub habitats in the Santa Monica Mountains, San Gabriel Mountains, Griffith Park, San Rafael Hills, Hansen Dam Open Space, Soledad Canyon north to Vasquez Rocks Natural Area Park. There are records for the Los Angeles Basin, but the basin no longer contains habitat for this species. Elevation records range from 40 to 1,364 m. This species was not reported in Willet (1944) and McLaughlin (1959) because at that time the populations in Los Angeles County were considered members of *P. eremicus*.

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Peromyscus maniculatus: North American deermouse

Hesperomys maniculatus (Wagner, 1845:148). Type locality is the Moravian settlements in Labrador.

Peromyscus maniculatus: Bangs, 1898:496. First use of current name combination.

Hesperomys sonoriensis Le Conte, 1853:413. Type from Santa Cruz, Sonora. Name combination.

Hesperomys gambelii Baird, 1858:464. Type locality is Monterey, Monterey County, California. Name combination.

Peromyscus catalinae Elliot, 1903c:160. Type locality is near Avalon, Santa Catalina Island, Santa Barbara Islands, Los Angeles County, California. Name combination.

Peromyscus texanus clementis Mearns, 1906:446. Type locality is Pyramid Cove, SE end San Clemente Island, Santa Barbara Islands, California.

P. m. catalinae Osgood, 1909:97. First use of current name combination. See above.

P. m. clementis Osgood, 1909:96. First use of current name combination. See above.

P. m. gambelii Osgood, 1909:67. First use of current name combination. See above.

P. m. sonoriensis Osgood, 1909:89. First use of current name combination. See above.

There are approximately 57 recognized subspecies of North American deermouse (Hall 1981; Carleton 1989; Bradley 2017c), four of which, occur in Los Angeles County: *P*eromyscus *maniculatus catalinae*, *clementis*, *gambelii,* and *sonoriensis*. In Los Angeles County, the North American deermouse is found in undeveloped areas of the county that support native habitat. Developed and urban areas no longer support habitat for the North American deermouse, but it was once present in these areas as demonstrated by older records such the record from the fossil beds at La Brea from 1915 and from Del Rey Marsh in 1929. *Peromyscus m. gambelii* is found in the San Gabriel Mountains from the divide westward to the coast, while *P. m. sonorensis* is found on the desert facing slopes of the San Gabriel Mountains and into the Mojave Desert area of northern Los Angeles County. *Peromyscus m. gambelii* has been recorded in the Santa Monica Mountains, Santa Susanna Mountains, Palos Verdes Hills, Santa Clarita, Soledad Canyon, and along the coast. However, this species was not reported present from the Ballona Wetlands Reserve (Johnson 2012). The other two subspecies occur only on the Channel Islands: *P. m. catalinae* on Santa Catalina Island and *P. m. clementis* on San Clemente Island. Elevation records from Los Angeles County range from sea level to 2,215 m.

Taxonomic note: Bradley et al. (2019) published a revision of *P. maniculatus,* which splits *P. maniculatus* into at least seven species. In Los Angeles County this would create a coastal species *P. gambellii* and inland species *P. sonoriensis*. This opinion is shared by Greenbaum et al. (2019). This checklist retains the standing taxonomy pending acceptance from the scientific community.

Peromyscus truei: Pinyon deermouse

Hesperomys truei (Shufeldt, 1885:407). Type locality, Fort Wingate, McKinley County, New Mexico.

P[*eromyscus*]. *Truei*: Thomas, 1894:365. First use of current name combination.

Peromyscus montipinoris Elliot, 1904:264. Type locality Lockwood Valley, near Mt. Pinos, Ventura Co., California. Name combination

P. t. chlorus Hoffmeister, 1941:131. Type locality, Lost Horse Mine, S end Little San Bernardino Mts., 69 mi E Riverside, Riverside County, California. First use of current name combination.

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P. t. montipinoris Hoffmeister, 1951:66. First use of current name combination. See above.

Of the 11 recognized subspecies of the pinyon deermouse (Hall 1981; Hoffmeister 1981; Modi and Lee 1984; Bradley 2017d), two occur in Los Angeles County: *Peromyscus truei montipinoris* and *chlorus*. *P. t. montipinoris* is found in forested and shrub habitats with rocky areas and brushy thickets with an understory of mixed shrubs throughout the Santa Monica Mountains, Santa Susanna Mountains, and San Gabriel Mountains. *P. t. chlorus* is found in a small area of the desert facing foothills of the San Gabriel Mountains in the vicinity of Lake Los Angeles and Wrightwood. Elevation records range from 196 to 2,415 m.

Reithrodontomys megalotis: Western harvest mouse

Reithrodon megalotis (Baird, 1858:451). Type locality, between Janos, Chihuahua and San Luis Springs, Grant County, New Mexico.

Reithrodon longicauda Baird, 1858:451. Type locality, Petaluma, Sonoma Co., California. Name combination.

Reithrodontomys megalotis: J. A. Allen, 1893:79. First use of current name combination.

Reithrodontomys catalinae Elliot, 1903b:246. Type locality, Santa Catalina Island, Santa Barbara Islands, California. Name combination.

R. m. catalinae Hooper, 1952:23. First use of current name combination. See above.

R. m. limicola von Bloeker, 1932b:133. Type locality, Playa del Rey, Los Angeles County, California. First use of current name combination.

R. m. longicauda Grinnell, 1913:303. First use of current name combination. See above.

R. m. megalotis Howell, 1914:14. First use of current name combination. See above.

Of the 15 recognized subspecies of the western harvest mouse (Hall 1981; Webster and Jones Jr. 1982; Bradley 2017e), four occur in Los Angeles County: *Reithrodontomys megalotis catalinae, limicola, longicaudus, and megalotis*. *Reithrodontomys m. catalinae* is found only on Santa Catalina Island. The other three subspecies occur on the mainland. The most coastal subspecies, *R. m. limicola,* is found in the Santa Monica Mountains, Palos Verdes Hills, and in coastal areas in between. There are records for this subspecies as far inland as downtown Los Angeles, but these inland areas are now developed and no longer support habitat for the western harvest mouse. However, along the coast, open space areas, such as the Ballona Wetlands Ecological Reserve still support a population of this subspecies (Johnson 2012). *Reithrodontomys m. longicaudus* occurs in the coast facing and desert facing slopes of the San Gabriel Mountains and along major drainages throughout this range, as well as in the Santa Susanna Mountains, Griffith Park, Verdugo Mountains, San Rafael Hills, Santa Clarita Valley, and Soledad Canyon. *Reithrodontomys m. megalotis* is found in the Mojave Desert. The western harvest mouse occurs in a wide range of habitats, including deserts, shrublands, riparian shrublands, grasslands, forests, and in early serial stages of most habitats and prefers thick grass or shrub cover. Elevation records range from sea level to 1,973 m.

Family Muridae

Mus musculus: House mouse

Mus musculus Linnaeus, 1758:59. Type locality is Uppsala, Sweden.

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The house mouse is native to Eurasia, but is now found worldwide (Haslauer 2017). The house mouse is found throughout Los Angeles County near human habitation in urban areas and less commonly in native habitats, but it has been found in the San Gabriel Mountains.

Rattus rattus: Black rat

[*Mus*] *rattus* (Linnaeus, 1758:61). Type locality is Uppsala, Sweden.
Rattus rattus: Hollister, 1916:126. First use of current name combination.

The black rat is native to the Indian Peninsula, but is now found worldwide (Fabre 2017a). It is found throughout Los Angeles County near human habitation in urban areas and less commonly in native habitats.

Rattus norvegicus: Brown rat

Mus norvegicus (Berkenhout, 1769:5). Type locality is England.
Rattus norvegicus: Hollister, 1916:126. First use of current name combination.

The Brown rat, also known as the Norway rat, is originally from northeast Asia, but now occurs worldwide (Fabre 2017b). In Los Angeles County the brown rat is found throughout the county near human habitation in urban areas and less commonly in native habitats.

Family Erethizontidae

Erethizon dorsatum: North American porcupine

[*Hystrix*] *dorsata* (Linnaeus, 1758:57). Type locality, eastern Canada.
Erethizon epixanthus Brandt 1835:390. Type locality, California.
Erethrizon dorsatum epixanthus True, 1884b:600.
Erethizon dorsatum epixanthum Anderson and Rand, 1943:293. First use of current name combination. See above.

Of the six recognized subspecies of the North American porcupine (Woods 1973; Hall 1981), one occurs in Los Angeles County: *Erethizon dorsatum epixanthum*. There is only one record for this species in Los Angeles County, from the Angeles National Forest at Hoot Owl Flats near the San Gabriel Reservoir (NHM-LAC number 8351; collected 1947). The North American porcupine is found in a broad variety of habitats including montane conifer, Douglas fir, wet meadows, hardwood-conifer, montane and valley-foothill riparian, aspen, and pinyon-juniper habitats. This species is probably more widespread than the museum records indicates. The elevation record for this individual is 508 m. This species was not reported in Willet (1944) and McLaughlin (1959).

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Appendix I

Museums represented in the database for which specimen records from Los Angeles County were used in this checklist include: Abilene Christian University Natural History Collection; American Museum of Natural History; Angelo State University, Angelo State Natural History Collections; Arizona State University; California Academy of Sciences; University of California Santa Barbara, Cheadle Center for Biodiversity and Ecological Restoration; Chicago Academy of Sciences; Cincinnati Museum Center, Geier Collections & Research Center; California State University Chico; California State University Long Beach; Cornell University, Museum of Vertebrates; Denver Museum of Nature & Science; Fort Hays State University, Sternberg Museum; Field Museum of Natural History; Humboldt State University, Wildlife Museum; University of Illinois, Illinois Natural History Survey; Louisiana State University, Museum of Natural Science; Illinois State Museum; Kansas University Biodiversity Institute and Natural History Museum; Natural History Museum of Los Angeles County; Harvard University, Museum of Comparative Zoology; University of California Berkeley, The Museum of Vertebrate Zoology at Berkeley; Occidental College, Moore Laboratory of Zoology; University of New Mexico, Museum of Southwestern Biology; Michigan State University Museum; North Carolina Museum of Natural Sciences; New Mexico Museum of Natural History and Science; University of Oklahoma, Sam Noble Oklahoma State Museum of Natural History; University of Puget Sound, Slater Museum of Natural History; Royal Ontario Museum; Santa Barbara Museum of Natural History; Texas A&M University, Biodiversity Research and Teaching Collections; Texas Tech University, Museum of Natural Science Research Laboratory; University of Arizona Museum of Natural History; University of British Columbia, Beaty Museum; University of California Los Angeles Donald R. Dickey Bird and Mammal Collection; University of Connecticut Biodiversity Research Collections; University of Florida; University of Michigan, Museum of Zoology; Smithsonian Institution National Museum of Natural History; University of Texas at El Paso Biodiversity Collections; University of Washington, Burke Museum of Natural History and Culture; University of Wyoming, Museum of Vertebrates; and Central Michigan University Museum of Cultural and Natural History.

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First Occurrence of a Giant Sea Cow (cf. *Hydrodamalis cuestae*) from the Pliocene Pico Formation of Santa Clarita, Southern California

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Sirenians, such as manatees and dugongs, are herbivorous marine mammals commonly called sea cows with a fossil record extending from middle Eocene deposits to the present (Domning 2001). An extinct, nine-meter-long sirenian species called *Hydrodamalis cuestae* (Domning 1978) (Fig. 1) once lived along the American Pacific coast. It is closely related to the similarly large Steller's sea cow, *Hydrodamalis gigas* (Zimmerman 1780), sharing a common ancestor with *H. gigas* and *H. spissa* (Furusawa 2004). *Hydrodamalis gigas,* also known as the Steller's sea cow, once inhabited the Bering Strait and was driven to extinction likely by 1768 due to overhunting (Domning and Furusawa 1994, Turvey and Risley 2006, Stejneger 1887).

In 2018, we discovered a large sirenian vertebra on private land on the eastern side of U.S. Interstate HWY 5 in the Newhall area, containing exposures of the Pico Formation (see Fig. 2 in Squires 2012). The Pico Formation is a marine deposit which has been dated at 3.6-2.5 million years (Winterer and Durham 1962) in the Santa Clarita area containing marine invertebrate fauna indicative of an inner sublittoral marine environment (Squires 2012). There are abundant invertebrate fossils at the site (e.g., turritellid gastropods, pectinid bivalves, echinoids, etc.) buried with pebble- to cobble-sized plutonic, volcanic, and metamorphic clasts in a sandy matrix. Specifically, we collected and identified the following invertebrate taxa at the site: *Tresus nuttallii, Glossaulax reclusiana, Turritella cooperi, Nassarius californianus,* and *Compsomyax subdiaphana. N. californianus* is restricted to the Pliocene (Squires 2012), confirming the deposit as Pliocene.

These fossiliferous beds appear to be storm deposits, as has been inferred for other Santa Clarita Pico Formation sites (Squires 2012, Winterer and Durnham 1962). Vertebrate fossils found at this Santa Clarita site include bones from mysticete and odontocete cetaceans, as well as a shark tooth (*Carcharodon* sp.). All of the vertebrate fossils found at the site so far are isolated and fragmentary. A large vertebra (formerly TMU 0101, now LACM 162832) was found by Matthew McLain on a hill slope at the site as float while leading a geology class field trip. We are confident it came from the Pico Formation and not from an overlying formation because there are no other formations above the fossil site at that location. It was collected with permission from the landowner and was donated to the Los Angeles County Museum of Natural History. Precise locality information is available upon request for qualified researchers.

The vertebra is large (dimensions listed in Table 1) and is still partially embedded in sandstone. The centrum is distinctly heart-shaped in anterior and posterior view, which is characteristic for sirenians (see, for example, Hautier et al. 2012). There is a sagittal keel on the ventral surface of the centrum. The left superior costal facet is present, but the right was lost due to fragmentation sometime after the fossil was exposed by weathering. The

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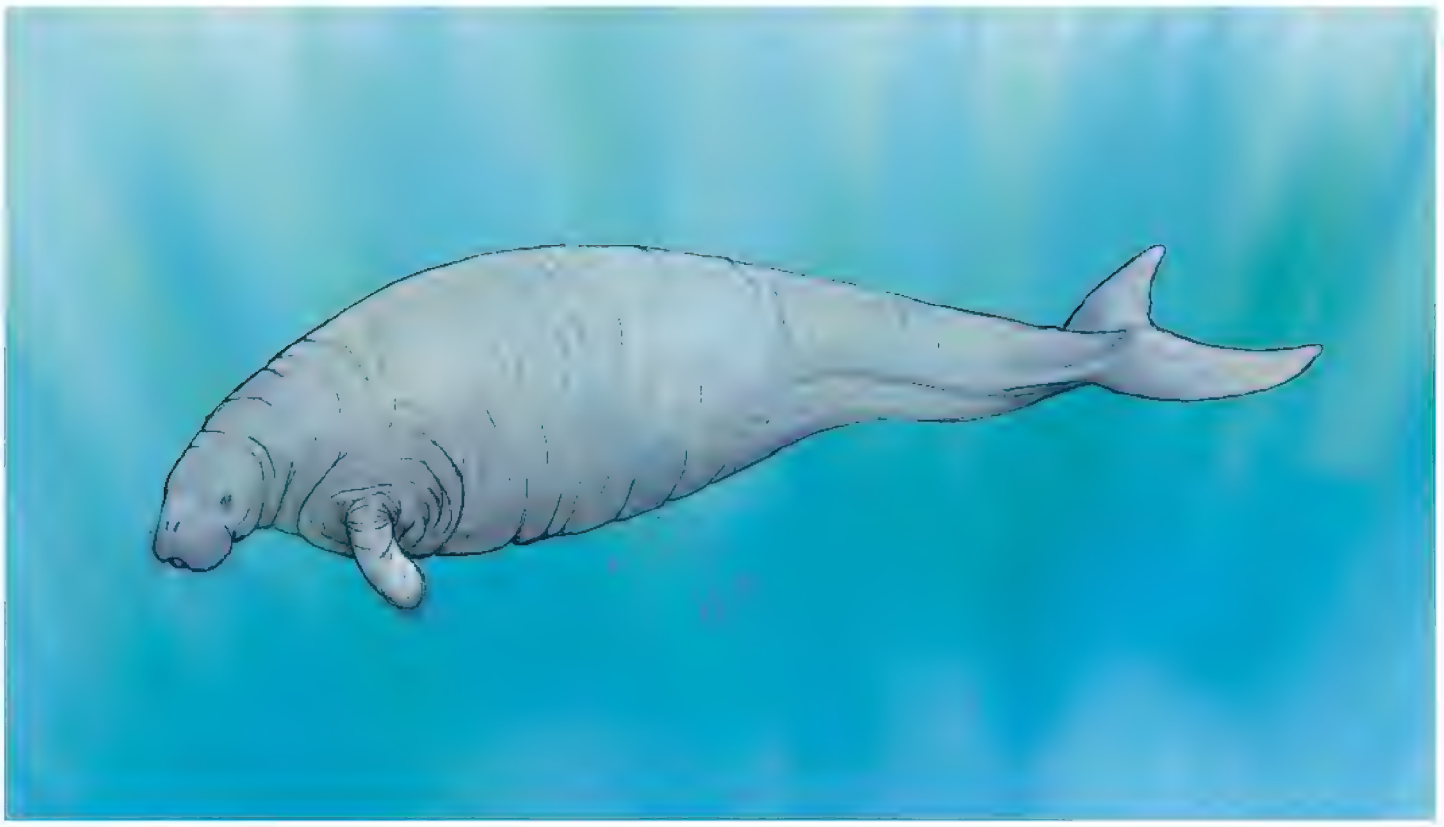

Fig. 1. Life reconstruction of Cuesta's sea cow (*Hydrodamalis cuestae*) by the author Charles Frederico, Jr.

Fig. 2. LACM 162832 vertebra referred to *Hydrodamalis cuestae* in three views: anterior, lateral, and posterior.

Table 1. Measurements of various aspects of the LACM 162832 vertebra.

Feature	Measurement
Width of centrum (widest point)	205 mm
Anterior height of centrum at central notch	138 mm
Anteroposterior thickness of centrum	124 mm
Posterior height of centrum at notch	133 mm
Width of superior costal facet	70 mm
Height of superior costal facet	88 mm
Height of whole specimen	320 mm

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Fig. 3. LACM 162832 (right) compared to SDNHM 35288 (left), a thoracic vertebra from *Hydrodamalis cuestae*.

vertebral foramen is still infilled with sediment, as is the right pedicle, although the left is visible. A large block of sandstone still covers the dorsal-most portion of the specimen, although it is clear that most of the neural spine is certainly absent and it was probably broken off from the rest of the vertebra before burial and diagenesis, as we see no obvious modern breaks on the dorsal portion of the specimen. Further preparation of the specimen will hopefully yield more insights.

The heart shape of the centrum is consistent with other observations of sirenian vertebrae (e.g., Domning 1978; Bell et al. 2020; Quiring and Harlan 1953). This contrasts sirenians with other marine mammals of equivalent size, however it is not clear if it is diagnostic of all Sirenia (Bell et al. 2020). The large size of the vertebra suggests that it belongs to the genus *Hydrodamalis* and its presence in Pliocene sediments of Southern California further suggests that it belongs to *H. cuestae*. This is supported by the fact that the only other *Hydrodamalis* species known are *H. gigas,* which was found in the Bering Strait, and *H. spissa* which was found in the Japanese islands (Domning 1978; Furusawa 2004). LACM 162832 was taken to the San Diego Natural History Museum and compared to a *H. cuestae* thoracic vertebrae (SDNHM 35288) from the San Diego Formation. The similarities between the two bones (Fig. 3) lead us to conclude that LACM 162832 is likely from a similar portion of the vertebral column.

Many fossils of *H. cuestae* have been found in southern California near San Diego and north to Laguna Hills, including the holotype, which was found at Avila Beach in San Luis Obispo County (Domning 1978). However, the record between Avila Beach and Laguna

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Hills is lacking, and this find extends the range of *H. cuestae* in southern California northward to the Santa Clarita Valley. This is also the first instance of *H. cuestae* from the Pico Formation. It is likely that further investigation at this and other Santa Clarita sites may yield more *H. cuestae* remains, as well as evidence from other Pliocene marine vertebrates.

We would like to thank the property owner for allowing us to collect the fossil and study it. We also want to thank T. Deméré for his assistance in comparing LACM 162832 to specimens from the San Diego Natural History Museum. S. McLeod and V. Rascona were very helpful throughout the process of donating the fossil to the Natural History Museum of Los Angeles County. Finally, we want to thank our editor and four reviewers whose assistance dramatically improved this manuscript.

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Unken Reflex in the California Red-legged Frog *Rana draytonii* in Western North America

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Interspecific interactions of the California red-legged frog have been much studied in recent decades (Alvarez et al. 2003; Cook and Jennings 2007; Bishop et al. 2014). Nevertheless, behaviors of *R. draytonii* specifically related to predator avoidance have either been accepted as putative or remain unpublished. *Rana draytonii* engages in two common defensive behaviors that are typical of most anurans when approached by potential predators: first, immobility, by which the frog eludes notice, and second, a fast leap into surrounding aquatic or upland habitat (Stebbins and Cohen 1995; pers obs.). Less commonly reported, but observed by the senior author, is a third defensive behavior, an alarm call, which is given off by many anurans (Stebbins and Cohen 1995; Duellman and Trueb 1994). Here we report *R. draytonii* engaged in a likely fourth defensive behavior, the "unken reflex".

While collecting data on the relative abundance of California red-legged frog larvae in the upper Kellogg Creek watershed (aka: Los Vaqueros Watershed) in eastern Contra Costa County, we were dip-netting for the species from numerous cattle stock ponds known to support the species. At the interpretive center pond (location: 37.842275° N, 121.724343° W), we captured an adult male *R. draytonii* (snout-urostyle length ~6.5 cm). As we removed it from the net for release, the frog abruptly assumed what has been reported as the unken reflex (see: Duellman and Trueb 1994; Fig. 1), a posture characterized by an arched back and front limbs extended upward. Among anurans, this posture is thought to be used defensively by the yellow-bellied toad (*Bombina variegata*) and the white-lipped bright-eyed treefrog (*Boophis albilabris*) and has also been more recently reported for the Florida gopher frog (*Lithobates capito aesopus*) (Duellman and Trueb 1994; Andreone 2003; Means 2004). The male frog we observed held the position for 45 to 60 sec before being released. As observed in *B. variegata*, *B. albilabris,* and *L. c. aesopus*, the frog was relatively rigid, its front limbs angled upward toward the eyes and the "palms" pointed upward (Fig. 1). Duellman and Trueb (1994) contend that this behavior allows the brightly colored venter to be exhibited to a potential predator, suggesting an aposematic purpose. Means (2004), however, strongly suggested that this behavior in *L. c. aesopus* is related to protection of the eyes from intraspecific interactions. It may be a combination of these postulated purposes that caused *R. draytonii* to use this behavior as a defensive mechanism, however, further research is required to fully understand this behavior. Our observation suggests that the unken reflex represents a fourth defensive behavior exhibited by this threatened species.

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Fig. 1. The unken reflex in *R. draytonii* in eastern Contra Costa County. Photograph by Jennifer L. Haire.

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